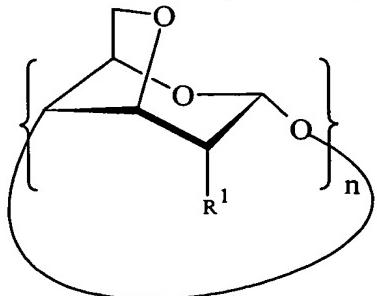
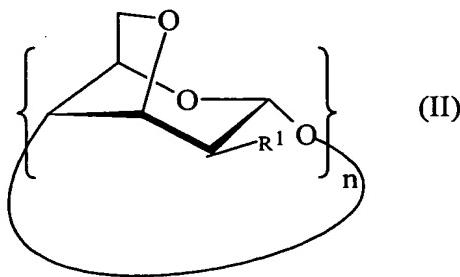


CLAIMS

1. Per(3,6-anhydro)cyclodextrin derivative corresponding to one of the following formulae:



(I)



(II)

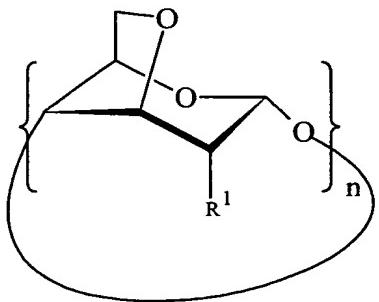
5

in which:

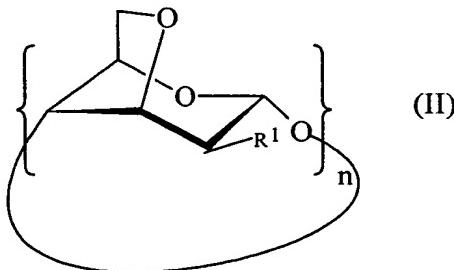
- at least one of the groups R¹ represents a group -OCONHR² and the other groups R¹, which may be identical or different, represent a group corresponding to one of the formulae: -OCONHR², -OH, -OR³, -SH, -SR³, -OCOR³, -NH₂, -NHR³, -NR³R⁴, -CONH₂, -CONHR³, -CONR³R⁴, -CN, -COOR³, -OCH₂CO₂H, -COOH and -R³, in which the group(s) R², which are identical or different, represent a saturated or unsaturated aliphatic group, R³ and R⁴, which are identical or different, represent a saturated or unsaturated, aliphatic or aromatic hydrocarbon group optionally substituted with halogen atoms which may contain one or more heteroatoms chosen from O, S and N, and/or
- at least one of the groups R¹ represents a group -OCONH(CR⁵R⁶)_mNHCOOR⁷, the other groups R¹ corresponding to the same definition as that given

above, R⁵ and R⁶, which are identical or different, represent H or a saturated or unsaturated aliphatic group, and R⁷ represents a glucosidic or maltosidic unit of the peranhydrocyclodextrin and m is an integer ranging from 1 to 20;

- n is equal to 6, 7 or 8.
- 2. Per(3,6-anhydro)cyclodextrin derivative according to Claim 1, in which all the groups R¹ represent the group -OCONHR² with R² having the same meaning as in Claim 1, and n is equal to 6.
- 3. Per(3,6-anhydro)cyclodextrin derivative according to Claim 2, in which R² represents an ethyl radical.
- 4. Per(3,6-anhydro)cyclodextrin derivative according to Claim 2, in which R² represents a hexyl radical.
- 5. Method for preparing a per(3,6-anhydro)cyclodextrin derivative corresponding to one of the following formulae (I) and (II):



(I)



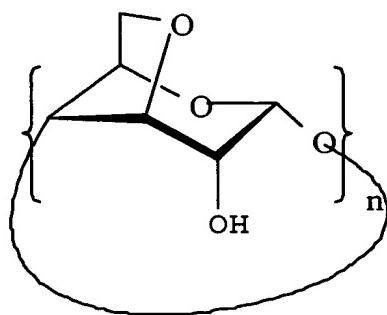
(II)

in which:

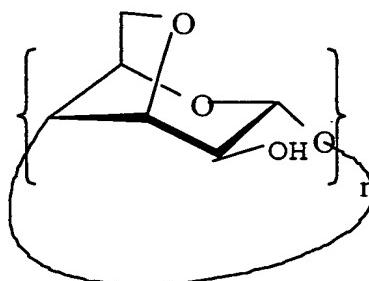
- at least one of the groups R¹ represents a group -OCONHR² and the other groups R¹, which may be identical or different, represent a group corresponding to one of the formulae: -OCONHR², -OH, -OR³, -SH, -SR³, -OCOR³, -NH₂, -NHR³, -NR³R⁴, -CONH₂, -CONHR³, -CONR³R⁴, -CN, -COOR³, -OCH₂CO₂H, -COOH and -R³, in which the R² group(s), which are identical or different, represent a saturated or unsaturated aliphatic group, R³ and R⁴, which are identical or different, represent a saturated or unsaturated, aliphatic or aromatic hydrocarbon group optionally substituted with halogen atoms which may contain one or more heteroatoms chosen from O, S and N, and/or

- at least one of the groups R¹ represents a group -OCONH(CR⁵R⁶)_mNHCOOR⁷, the other groups R¹ corresponding to the same definition as that given above, R⁵ and R⁶, which are identical or different, represent H or a saturated or unsaturated aliphatic group, and R⁷ represents a glucosidic or maltosidic unit of the peranhydrocyclodextrin and m is an integer ranging from 1 to 20;

- n is equal to 6, 7 or 8,
said process comprising successively:
- a step consisting in reacting a per(3,6-anhydro)cyclodextrin corresponding to one of the following formulae (III) or (IV):



(III)

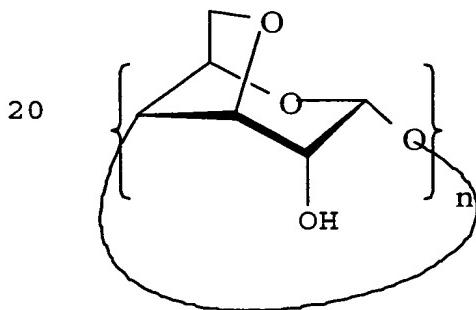


(IV)

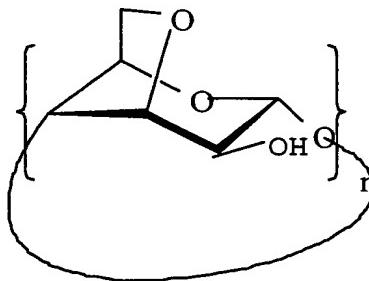
in which n is equal to 6, 7 or 8, with an isocyanate of formula $\text{OCN}-\text{R}^2$ and/or a diisocyanate $\text{OCN}(\text{CR}^5\text{R}^6)_m\text{NCO}$ in a quantity such that at least one of the OH groups is converted to a group $-\text{OCONHR}^2$ and/or to a group $-\text{OCONH}(\text{CR}^5\text{R}^6)_m\text{NHCOOR}^7$; and

- a step consisting, when not all the OH groups have been converted to a group $-\text{OCONHR}^2$ and/or $-\text{OCONH}(\text{CR}^5\text{R}^6)_m\text{NHCOOR}^7$, in optionally reacting the remaining OH groups with one or more reagents in order to convert them to the desired groups R^1 different from $-\text{OCONHR}^2$ and/or $-\text{OCONH}(\text{CR}^5\text{R}^6)_m\text{NHCOOR}^7$.

- 15 6. Polymer obtained by reacting at least two per(3,6-anhydro)cyclodextrins corresponding to one of the following formulae (III) or (IV):

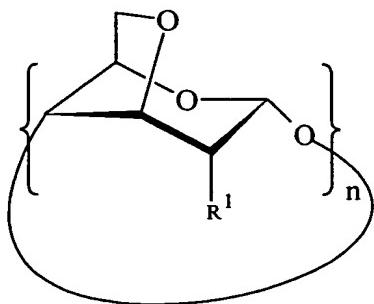


(III)

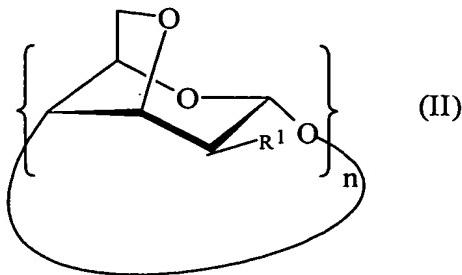


(IV)

- in which n is equal to 6, 7 or 8 and a diisocyanate of formula OCN- (CR⁵R⁶)_m-NCO, in which R⁵ and R⁶, which are identical or different, represent H or a saturated or unsaturated aliphatic group and m is an integer ranging from 1 to 20, the OH groups having not reacted during the reaction to be optionally converted into groups, which are identical or different, representing groups chosen from: -OCONHR², -OR³, -SH, -SR³, -OCOR³, -NH₂, -NHR³, -NR³R⁴, -CONH₂, -CONHR³, -CONR³R⁴, -CN, -COOR³, -OCH₂COOH, -COOH and -R³, in which the group(s) R² represent a saturated or unsaturated aliphatic group, R³ and R⁴, which may be identical or different, represent a saturated or unsaturated, aliphatic or aromatic hydrocarbon group optionally substituted with halogen atoms which may contain one or more heteroatoms chosen from O, S and N.
- 20 7. Polymer according to Claim 6, for which n is equal to 6 and R⁵ and R⁶ both represent H and m is equal to 6.
- 25 8. Method for binding and separating ions, comprising the steps consisting in:
- bringing a medium containing the said ions into contact with:
- 30 1) a per(3,6-anhydro)cyclodextrin derivative corresponding to one of the following formulae (I) or (II):



(I)



(II)

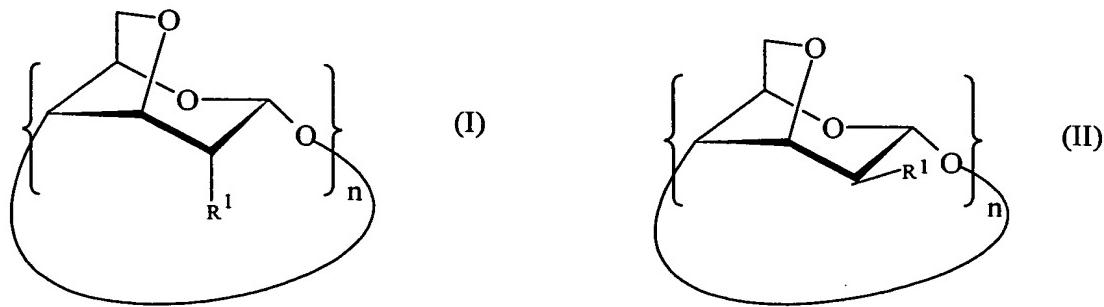
in which:

- 5 - at least one of the groups R^1 represents a group
 $-OCONHR^2$ and the other groups R^1 , which may be
 identical or different, represent a group
 corresponding to one of the formulae: $-OCONHR^2$,
 $-OH$, $-OR^3$, $-SH$, $-SR^3$, $-OCOR^3$, $-NH_2$, $-NHR^3$, $-NR^3R^4$,
 10 $-CONH_2$, $-CONHR^3$, $-CONR^3R^4$, $-CN$, $-COOR^3$, $-OCH_2CO_2H$,
 $-COOH$ and $-R^3$, in which the group(s) R^2 , which are
 identical or different, represent a saturated or
 unsaturated aliphatic group, R^3 and R^4 , which are
 identical or different, represent a saturated or
 15 unsaturated, aliphatic or aromatic hydrocarbon
 group optionally substituted with halogen atoms
 which may contain one or more heteroatoms chosen
 from O, S and N, and/or
- 20 - at least one of the groups R^1 represents a group
 $-OCONH(CR^5R^6)_mNHCOOR^7$, the other groups R^1
 corresponding to the same definition as that given
 above, R^5 and R^6 , which are identical or different,
 represent H or a saturated or unsaturated aliphatic
 25 group, and R^7 represents a glucosidic or maltosidic

unit of the peranhydrocyclodextrin and m is an integer ranging from 1 to 20;

- n is equal to 6, 7 or 8,
5 and/or
- 2) a polymer obtained by reacting at least two per(3,6-anhydro)cyclodextrins of formula (III) or (IV), as defined in claim 6, and a diisocyanate of formula OCN- (CR⁵R⁶)_m-NCO, for which R⁵ and R⁶, which are identical or different, represent H or a saturated or unsaturated aliphatic group and m is an integer ranging from 1 to 20, the OH groups having not reacted during the reaction to be optionally converted into groups, which are identical or different, representing groups chosen from: -OCONHR², -OR³, -SH, -SR³, -OCOR³, -NH₂, -NHR³, -NR³R⁴, -CONH₂, -CONHR³, -CONR³R⁴, -CN, -COOR³, -OCH₂CO₂H, -COOH and -R³, in which the group(s) R², which are identical or different, represent a saturated or unsaturated aliphatic group, R³ and R⁴, which may be identical or different, represent a saturated or unsaturated, aliphatic or aromatic hydrocarbon group which may contain one or more heteroatoms chosen from O, S and N, and n is equal to 6, 7 or 8, in order to bind the said ions in the form of a complex with the per(3,6-anhydro)cyclodextrin derivative or the polymer; and separating the said ions thus complexed from the said medium.
30
- 9. Method according to Claim 8, in which the said ions are anions based on chromium or manganese.

10. Method according to Claims 8 or 9, in which the per(3,6-anhydro)cyclodextrin derivative corresponds to formula (I) in which all the groups R¹ represent the group -OCONHR² with R² having the
5 same meaning as in Claim 1, and n is equal to 6.
11. Method according to Claim 10, in which R² represents an ethyl or hexyl radical.
- 10 12. Method according to Claim 8 or 9, in which the polymer is as defined in Claim 7.
- 15 13. Method according to any one of Claims 8 to 12, in which, since the said medium is an aqueous solution, the per(3,6-anhydro)cyclodextrin derivative or the polymer is dissolved in an organic solvent which is immiscible with the said aqueous solution.
- 20 14. Pharmaceutical composition for the decontamination, in relation to ions based on chromium or manganese, of a human being, comprising:
 - (1) a per(3,6-anhydro)cyclodextrin derivative corresponding to one of the following formulae (I) or (II):
- 25



in which:

- 5 - at least one of the groups R¹ represents a group -OCONHR² and the other groups R¹, which may be identical or different, represent a group corresponding to one of the formulae: -OCONHR², -OH, -OR³, -SH, -SR³, -OCOR³, -NH₂, -NHR³, -NR³R⁴, -CONH₂, -CONHR³, -CONR³R⁴, -CN, -COOR³, -OCH₂CO₂H, -COOH and -R³, in which the group(s) R², which are identical or different, represent a saturated or unsaturated aliphatic group, R³ and R⁴, which are identical or different, represent a saturated or unsaturated, aliphatic or aromatic hydrocarbon group optionally substituted with halogen atoms which may contain one or more heteroatoms chosen from O, S and N, and/or

10

15

20 - at least one of the groups R¹ represents a group -OCONH(CR⁵R⁶)_mNHCOOR⁷, the other groups R¹ corresponding to the same definition as that given above, R⁵ and R⁶, which are identical or different, represent H or a saturated or unsaturated aliphatic group, and R⁷ represents a glucosidic or maltosidic

25

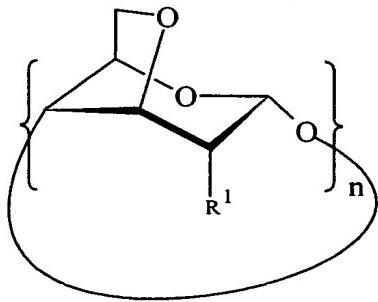
unit of the peranhydrocyclodextrin and m is an integer ranging from 1 to 20;

- n is equal to 6, 7 or 8,
- 5 and/or
- (2) a polymer as defined in Claims 6 and 7.

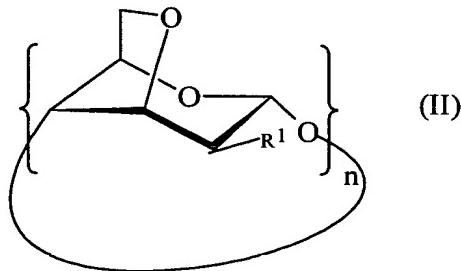
15. Pharmaceutical composition according to Claim 14, in which all the groups R¹ represent the group -O-CO-NHR² and n is equal to 6, R² having the same meaning as in Claim 1.

16. Complex of an ion chosen from CrO₄²⁻, Cr₂O₇²⁻ and MnO₄²⁻ with:

15 (1) a per(3,6-anhydro)cyclodextrin derivative corresponding to one of the following formulae:



(I)



(II)

in which:

- 20
- at least one of the groups R¹ represents a group -OCONHR² and the other groups R¹, which may be identical or different, represent a group corresponding to one of the formulae: -OCONHR², -OH, -OR³, -SH, -SR³, -OCOR³, -NH₂, -NHR³, -NR³R⁴, -CONH₂, -CONHR³, -CONR³R⁴, -CN, -COOR³, -OCH₂CO₂H,
- 25

- COOH and -R³, in which the group(s) R², which are identical or different, represent a saturated or unsaturated aliphatic group, R³ and R⁴, which are identical or different, represent a saturated or
5 unsaturated, aliphatic or aromatic hydrocarbon group optionally substituted with halogen atoms which may contain one or more heteroatoms chosen from O, S and N, and/or
- 10 - at least one of the groups R¹ represents a group -OCONH(CR⁵R⁶)_mNHCOOR⁷, the other groups R¹ corresponding to the same definition as that given above, R⁵ and R⁶, which are identical or different, represent H or a saturated or unsaturated aliphatic
15 group, and R⁷ represents a glucosidic or maltosidic unit of peranhydrocyclodextrin and m is an integer ranging from 1 to 20;
- n is equal to 6, 7 or 8,
20 and/or
(2) a polymer as defined in Claims 6 and 7.
17. Complex according to Claim 16, in which the per(3,6-anhydro)cyclodextrin derivative corresponds
25 to formula (I) in which all the groups R¹ represent the group -O-CO-NHR² and n is equal to 6, R² having the same meaning as in Claim 1.